I. AMENDMENTS TO THE CLAIMS

Please find below a listing of claims that will replace all prior versions, and listings, of claims in the application.

Listing of claims

1. – 2. (*cancelled*)

3. (*currently amended*) An optical signal generator, comprising:

an optical source adapted to generate an optical signal including ~~at least one~~ a plurality of carrier signals at [[a]] respective generated carrier ~~frequency~~ frequencies that [[is]] are adjustable by [[a]] corresponding frequency control signals, each carrier signal being associated with a respective target carrier frequency;

a multi-channel optical filter having a filter input port connected to the optical source and having a plurality of filter output ports, each filter output port being associated with a respective optical channel having a pass band surrounding a different respective channel center frequency;

for ~~at least one~~ each target carrier frequency, a first detection unit and a second detection unit [[each]] respectively associated with said target carrier frequency, [[and]] each connected to a different [[ones]] one of the filter output ports, ~~each detection unit associated with a particular target carrier frequency being~~ and each adapted to output an indication of a characteristic of ~~the particular~~ said target carrier frequency in the optical signal present at the filter output port to which ~~said detection unit~~ it is connected, wherein the filter output port connected to one of the first detection unit and the second detection unit respectively associated with a first target carrier frequency is connected to one of the first detection unit and the second detection unit respectively associated with a second target carrier frequency different from the first target carrier frequency; and

a control unit connected to the ~~detection units~~ first detection unit and the second detection unit respectively associated with each target carrier frequency and to the optical

source, [[the]] said control unit being operable to generate the frequency control signal corresponding to [[a]] each particular carrier signal as a function of the output of the first detection unit and the second detection unit respectively ~~detection units~~ associated with the target carrier frequency that is associated with [[the]] said particular carrier signal, thereby to align the generated carrier frequency of [[the]] said particular carrier signal with the target carrier frequency associated with [[the]] said particular carrier signal.

4. (*original*) An optical signal generator as claimed in claim 3, wherein the first detection unit associated with a particular target carrier frequency is connected to a filter output port associated with an optical channel having a channel center frequency less than the particular target carrier frequency and wherein the second detection unit associated with the particular target carrier frequency is connected to a filter output port associated with an optical channel having a channel center frequency greater than the particular target carrier frequency.

5. (*currently amended*) An optical signal generator as claimed in claim 4, wherein the optical source is adapted to modulate at least one of the carrier signals in accordance with a modulation signal having a characteristic uniquely associated with the target carrier frequency associated with [[the]] said carrier signal, and wherein each of the first detection unit and the second detection unit respectively associated with a particular target carrier frequency is adapted to output an indication of the extent to which said characteristic of the modulation signal associated with the particular target carrier frequency appears in the optical signal present at the filter output port to which ~~said detection unit~~ it is connected.

6. (*currently amended*) An optical signal generator as claimed in claim 4, wherein the optical source is adapted to modulate at least one of the carrier signals in accordance with a modulation signal uniquely associated with the target carrier frequency associated with [[the]] said carrier signal, and wherein each of the first detection unit and the second detection unit respectively associated with a particular target carrier frequency is adapted

to output the amplitude of the modulation signal associated with the particular target carrier frequency appearing in the optical signal present at the filter output port to which ~~said detection unit~~ it is connected.

7. (*original*) An optical signal generator as claimed in claim 6, wherein each modulation signal associated with a different target carrier frequency has a set of at least one unique electrical frequency.

8. (*currently amended*) An optical signal generator as claimed in claim 5, wherein said control unit comprises a respective comparator connected to the first detection unit and the second detection unit respectively ~~second detection units~~ associated with ~~the same~~ a particular target carrier frequency.

9. (*currently amended*) An optical signal generator as claimed in claim 8, wherein said comparator [[being]] is adapted to determine the difference in the amplitude of the modulation signal associated with ~~said same~~ the particular target carrier frequency as measured in different optical channels, [[the]] said control unit being further adapted to compare said difference to a pre-determined offset, thereby to generate the frequency control signal corresponding to the carrier signal associated with ~~said same~~ the particular target carrier frequency.

10. (*original*) An optical signal generator as claimed in claim 9, wherein said pre-determined offset depends on the response of the optical filter in the pass bands of the optical channels associated with the two different filter output ports to which said first and second detection units are connected.

11. (*original*) An optical signal generator as claimed in claim 10, wherein said offset is substantially zero.

12. (*original*) An optical signal generator as claimed in claim 9, wherein the channel center frequencies and the target carrier frequencies are interleaved.

13. (*original*) An optical signal generator as claimed in claim 9, wherein the channel center frequencies are aligned with the target carrier frequencies.

14. (*original*) An optical signal generator as claimed in claim 9, wherein at least two channel center frequencies are located between each pair of adjacent target carrier frequencies.

15. (*original*) An optical signal generator as claimed in claim 3, further comprising a coarse wavelength capture module connected between at least one filter output port and the optical source, said coarse wavelength capture module being adapted to determine whether at least one generated carrier frequency is substantially outside a neighbourhood of the associated target carrier frequency and further adapted to instruct the optical source to adjust such generated carrier frequency until it is determined to be within said neighbourhood of the associated target frequency.

16. (*currently amended*) An optical signal generator as claimed in claim 15, further comprising an output switch connected to the optical source, for controllably passing selected ones of the carrier signals generated by the optical source to a location external to the optical signal generator, said output switch being controllable by said coarse wavelength capture module to block at least one carrier signal when its associated generated carrier frequency is outside said neighbourhood of the associated target carrier frequency.

17. (*currently amended*) An optical signal generator as claimed in claim 7, further comprising:

for each of at least one target carrier frequency, a third detection unit respectively associated with said target carrier frequency and connected to the particular filter output

port whose associated channel center frequency is closest to said target carrier frequency, wherein the third detection unit associated with a particular target carrier frequency is adapted to output the amplitude of the modulation signal associated with the particular carrier frequency as it appears in the optical signal present at the filter output port to which ~~said third detection unit~~ it is connected;

wherein the control unit is further connected to each third detection unit and wherein the control unit is further operable to adjust the amplitude of a particular carrier signal as a function of the output of the third detection unit associated with the target carrier frequency associated with [[the]] said particular carrier signal.

18. (*currently amended*) An optical signal generator as claimed in claim 3, further comprising a power combiner associated with each ~~of at least one~~ target carrier frequency, wherein the power combiner associated with a particular target carrier frequency comprises two inputs respectively connected to the first detection unit and the second detection unit respectively ~~second detection units~~ associated with the particular target carrier frequency.

19. (*currently amended*) An optical signal generator as claimed in claim 18, wherein the power combiner associated with a particular target carrier frequency is adapted to determine the total power of [[the]] a modulation signal associated with the particular target carrier frequency as measured in different optical channels, the control unit being further adapted to adjust the amplitude of the carrier signal associated with the particular target carrier frequency as a function of the output of the power combiner associated with the particular target carrier frequency.

20. (*currently amended*) An optical signal generator as claimed in claim 19, wherein each of the first detection unit and the second detection unit respectively ~~second detection units~~ associated with a particular target carrier frequency comprises a power monitor adapted to measure a power level of the optical signal present at the filter output port to which said detection unit is connected, each of the first detection unit and the second

detection unit respectively ~~second detection units~~ associated with a particular target carrier frequency being further adapted to provide the respective measured power level to a respective input of the power combiner to which said detection unit is connected.

21. (*currently amended*) An optical signal generator as claimed in claim 4, wherein the optical source is adapted to modulate at least one of the carrier signals in accordance with a modulation signal having a characteristic uniquely associated with the target carrier frequency associated with [[the]] said carrier signal;

wherein each of the first detection unit and the second detection unit respectively associated with a particular target carrier frequency includes:

(i) a modulation signal detector adapted to output an indication of the extent to which said characteristic of the modulation signal associated with the particular target carrier frequency appears in the optical signal present at the filter output port to which said detection unit is connected; and

(ii) a power monitor adapted to measure a power level of the optical signal present at the filter output port to which said detection unit is connected;

wherein said control unit includes:

(i) a respective comparator associated with ~~the particular~~ each target carrier frequency; and

(ii) a switch having inputs connected to the modulation signal detector and the power monitor in both the first detection unit and the second detection unit respectively ~~second signal detection units~~ associated with [[the]] a particular target carrier frequency and having outputs connected to the comparator associated with the particular target carrier frequency, the switch being operable in a first state wherein the output of the modulation signal detectors is provided to the comparator and a second state wherein the output of the power monitors is provided to the comparator.

22. (*original*) An optical signal generator as claimed in claim 21, wherein the comparator associated with a particular target carrier frequency is adapted to determine the difference between the signals received from the switch to which it is connected, the control unit being further adapted to compare said difference to a pre-determined offset, thereby to generate the frequency control signal corresponding to the carrier signal associated with the particular target carrier frequency.

23. (*original*) An optical signal generator as claimed in claim 22, each switch being operable to change states as a function of the stability of the difference determined by the comparator to which said switch is connected.

24. (*original*) An optical signal generator as claimed in claim 22, further comprising a power combiner associated with each of at least one target carrier frequency, wherein the power combiner associated with a particular target carrier frequency comprises two inputs connected to the outputs of the switch connected to the first and second detection units associated with the particular target carrier frequency.

25. (*original*) An optical signal generator as claimed in claim 24, wherein the power combiner associated with a particular target carrier frequency is adapted to determine an estimate of the total power of the modulation signal associated with the particular target carrier frequency as measured in different optical channels, the control unit being further adapted to adjust the amplitude of the carrier signal associated with the particular target carrier frequency as a function of the output of the power combiner associated with the target carrier frequency associated with the particular carrier signal.

26. (*currently amended*) An optical signal generator as claimed in claim 3, ~~wherein said optical signal generated by the source includes at least two carrier signals~~ wherein the optical source comprises an optical multiplexer for combining the ~~at least one~~ carrier

signals into a composite optical signal, said optical multiplexer having an output port connected to the filter input port.

27. (*currently amended*) An optical signal generator as claimed in claim 3, further comprising ~~at least one~~ a plurality of receivers, each receiver being connected between a respective one of the filter output ports and ~~at least one of the detection units~~ one of the first detection unit and the second detection unit respectively associated with a respective target carrier frequency, ~~each receiver~~ and being adapted to provide opto-electronic conversion of an optical signal received from [[the]] said respective one of the filter output ports into an electrical signal provided to the ~~at least one of the detection units~~ said one of the first detection unit and the second detection unit respectively associated with said respective target carrier frequency.

28. (*currently amended*) An optical signal generation apparatus, comprising:

a plurality of optical signal generators as claimed in claim 3;

each said optical signal generator further comprising a switch for controllably allowing selected ones of the carrier signals to exit said optical signal generator;

the control units of said optical signal generators being interconnected and each being further adapted to control the respective switch in order to ensure that the carrier signal associated with each target carrier frequency is allowed to exit at most one of said optical signal generators; and

a combiner for combining the carrier signals exiting the plurality of optical signal generators.

29. – 36. (*cancelled*)

37. (*new*) Apparatus for stabilizing respective optical carrier frequencies of a plurality of generated carrier signals with respect to respective target carrier frequencies, each generated carrier signal being associated with a respective target carrier frequency, the plurality of carrier signals being included in an optical signal generated by an optical

source, the optical source being adapted to adjust the respective optical carrier frequency of each generated carrier signal in accordance with a corresponding frequency control signal, said apparatus comprising:

a multi-channel optical filter having a filter input port for connection to the optical source and having a plurality of filter output ports, each filter output port being associated with a respective optical channel having a pass band surrounding a different respective channel center frequency;

for each target carrier frequency, a first detection unit and a second detection unit respectively associated with said target carrier frequency, each connected to a different one of the filter output ports, and each adapted to output an indication of a characteristic of said target carrier frequency in the optical signal present at the filter output port to which it is connected, wherein the filter output port connected to one of the first detection unit and the second detection unit respectively associated with a first target carrier frequency is connected to one of the first detection unit and the second detection unit respectively associated with a second target carrier frequency different from the first target carrier frequency; and

a control unit for connection to the optical source and connected to the first detection unit and the second detection unit respectively associated with each target carrier frequency, said control unit being operable to generate the frequency control signal corresponding to each particular generated carrier signal as a function of the output of the first detection unit and the second detection unit respectively associated with the target carrier frequency that is associated with said particular generated carrier signal, thereby to stabilize the optical carrier frequency of said particular generated carrier signal with respect to the target carrier frequency associated with said particular generated carrier signal.